

## Quadratic Relations Review

1) State whether each relation is quadratic. Justify your decision.

a.  $y = 4x - 5$

b.

X	Y
-3	56
-2	35
-1	18
0	5
1	-4
2	-9
3	-10

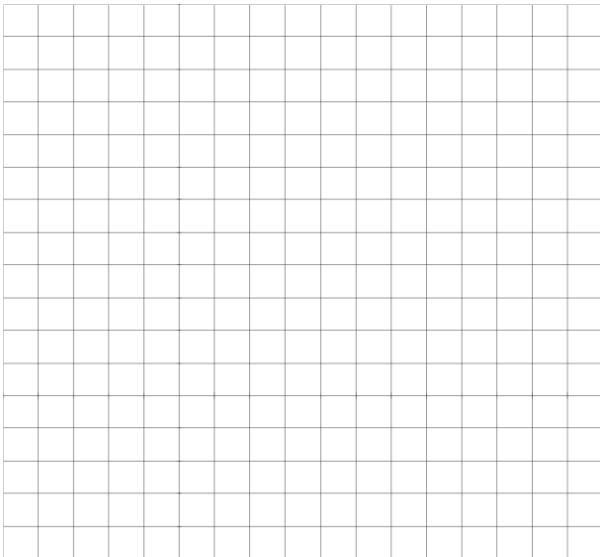
c.  $y = 2x(x-5)$

2) Graph each quadratic relation and determine

- The equation of the axis of symmetry
- The coordinates of the vertex
- The y-intercept
- The zeros

i.  $y = x^2 - 8x$

ii)  $y = x^2 + 2x - 15$



- 3) The roots of a quadratic relation are -2 and 5, and the second differences are negative.
- Is the y-value of the vertex a maximum value or a minimum value? Explain.
  - Is the y-value of the vertex positive or negative? Explain
  - Calculate the x-coordinate of the vertex
- 4) What does  $a$  in the equation  $y = ax^2 + bx + c$  tell you about the parabola?
- 5) The Rudy Snow Company makes custom snowboards. The company's profit can be modelled with the relation  $y = -6x^2 + 42x - 60$ , where  $x$  is the number of snowboards sold (in thousands) and  $y$  is the profit (in hundreds of thousands of dollars).
- How many snowboards does the company need to sell to break even?
  - How many snowboards does the company need to sell to maximize their profits?
- 6) The x-intercepts of a parabola are -2 and 7, and the y-intercept is -28.
- Determine the coordinates of the vertex.
  - Determine an equation for the parabola.

7) Determine an equation for each parabola.

a. The x-intercepts are 5 and 9, and the y-coordinate of the vertex is -2.

b. The x-intercepts are -3 and 3, and the parabola passes through the point (2,20).

8) A bus company usually transports 12 000 people per day at a ticket price of \$1. The company wants to raise the ticket price. For every \$0.10 increase in the ticket price, the number of riders per day is expected to decrease by 400. Calculate the ticket price that will maximize revenue.

9) Expand and simplify

a.  $(X+5)(X+4)$

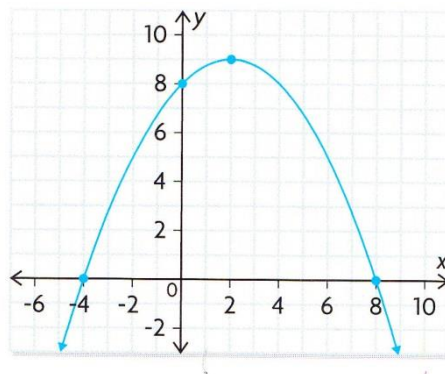
b.  $(2x-3)(2x+3)$

c.  $(4x-2y)(5x+3y)$

d.  $(2x+6)^2$

e.  $2x(4x-y)(4x+y)$

10) Determine the equation of the parabola. Express your answer in standard form.



11) Factor each expression.

a.  $20x^2 - 4x$

b.  $3n^2 - 6n + 15$

c.  $-2x^3 + 6x^2 + 4x$

d.  $6a(3-7a) - 5(3-7a)$

e.  $x^2 + 16x + 63$

f.  $x^2 + 6x - 27$

g.  $x^2 - 7x - 60$

h.  $5x^2 - 5x - 100$

12) Examine the relation  $y = x^2 + 7x + 12$

- a. Write the relation in factored form.
- b. Determine the coordinates of the x-intercepts.
- c. Determine the coordinates of the vertex.
- d. State the minimum value of the relation and where the minimum value occurs.

13) Explain the strategy you would use to factor each trinomial.

a.  $15x^2 - 4x - 4$

b.  $7a^2 + 6a - 16$

c.  $20x^2 + 3x - 2$

d.  $20y^2 - 17y - 10$

14) Factor each expression.

a.  $7x^2 - 19x - 6$

b.  $4a^2 + 23a + 15$

c.  $12a^2 - 16a + 5$

d.  $6a^2 - 11ay - 10y^2$

15) Erica and Asif sell newly designed digital watches. The profit on the watches they sell is determined by the relation  $P = -2n^2 + 120n - 1000$ , where  $n$  is the number of watches sold and  $P$  is the profit in dollars.

a. What are the break-even points for Erica and Asif?

b. What is the maximum profit that Erica and Asif can earn?

16) Factor each expression

a.  $144x^2 - 25$

b.  $18x^5 - 512xy^2$

c.  $(x + 5)^2 - y^2$

d.  $7x^2 - 26x - 8$

e.  $18ac - 12a - 15c + 10$

f.  $20x^2 + 61x + 45$

g.  $2s^2 + 3s - 5$

h.  $z^4 - 4z^2 - 32$

i.  $9 - 30g + 25g^2$

17) Determine the coordinates of the vertex of each relation.

a.  $y = x^2 - 10x + 24$

b.  $y = -5x^2 + 500$

c.  $y = 4x^2 + 16x$